Existence results for a nonlinear transport equations in bounded geometry on L^1–spaces

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Abstract

In this talk we present some existence results for a multi-dimensional nonlinear transport equation in bounded geometry on L^1–sapces. The problem may be transformed into a fixed point problem of the form

$$A\psi + B\psi = \psi. \qquad (\bigstar)$$

But, due to the lack of compactness of the involved operators on L^1–spaces, the classical fixed point theorem of Krasnoselskii does not work. Using recent versions of the Darbo and Krasnoselskii fixed point theorems for the weak topology we show that, for each $r > 0$, the problem $(\bigstar)$ has at least one solution on B_r where B_r denotes the closed ball centered at zero with radius r. The main arguments in our analysis are the dissipativity of the streaming operator (for dissipative boundary conditions) and the fact that one of the operators above (for example A) maps weakly compact sets of L^1 into norm compact ones.